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reau of Standards, Pittsburgh, Pa. The agricultural department offers this year, January 19-31, some new courses in forge work and carpentry. These courses will under the immediate charge of Director Benedict, of the mechanical engineering department.

At the Massachusetts Institute of Technology Dr. H. O. Taylor has been appointed to be research associate in the research laboratory of electrical engineering, and Francis Byron Morton to be assistant in physics, in place of F. I. Hunt, resigned.

At Vassar College Dr. Elizabeth B. Cowley, instructor in mathematics, has been made assistant professor of mathematics.

THE governors of the Imperial College of Science and Technology have constituted two new chairs of chemistry, and appointed two new professors—Dr. Jocelyn Field Thorpe, professor of organic chemistry, and Dr. James C. Philip, professor of physical chemistry.

DISCUSSION AND CORRESPONDENCE

ON THE IDENTITY OF VERRUGA AND CARRION'S FEVER

WE are indebted to Dr. Richard P. Strong, of the Harvard Medical School, for reopening the question of the unity or duality of Carrion's fever and eruptive verruga, so termed. Assisted by Dr. E. E. Tyzzer, he carried out an interesting series of experiments at the bacteriological laboratory of the Institute of Hygiene in Lima, from June to August, 1913, in cooperation with Dr. Júlio C. Gastiaburú, the director of that laboratory. Some of the details of the results obtained were presented to the Fifth Latin American Medical Congress in Lima by Dr. Gastiaburú on November 14, 1913, causing a great sensation in Peruvian medical circles. It is not too much to say that this announcement has fallen like a thunderbolt in Lima. The thorough probing of the problem which will undoubtedly follow swiftly upon this reopening of the case will certainly bring the truth to the surface and settle the matter with finality. From the entomological and protozoological points of view, as well as from such clinical and other

points of view as present themselves to the writer, the following data seem to bear definitely upon this subject.

Reasons why Carrion's fever and eruptive verruga (so-called) are respectively malignant and benign forms of one disease:

1. They have identically the same geographical distribution so far as known.
2. They are connected by every possible gradation of clinical symptoms.
3. The bone pains which are characteristic of the benign form often occur with marked severity associated with such high temperatures that the case must be diagnosed as malignant or Carrion's fever rather than benign or eruptive verruga (so-called).
4. Carrion's fever is always followed by the eruption, usually of the miliar but sometimes of the nodular type, the latter being more distinctive of the benign form of the disease, this indicating the identity of the malignant and benign forms etiologically.
5. Infection by *Phlebotomus verrucarum* from the same locality produces both in both man and laboratory animals, sometimes giving rise to one and sometimes to the other, apparently according to the severity of the infection due to the number of the infective *Phlebotomus* concerned or to the degree of resistance of the host infected.
6. The bodies named *Bartonella bacilliforme* by Strong and Gastiaburú are present in both, their abundance being apparently in direct ratio to the degree of fever exhibited at any time in any given case of either, and they disappear from the peripheral circulation of both immediately before the appearance of the eruption, though they may return if the course of the eruption be interrupted by pyrexial relapse, disappearing finally on the definite and uninterrupted sequence of the eruption.
7. The bodies *Bartonella bacilliforme* are quite evidently not organisms, but changes wrought in the red cells by the activities of the as yet undiscovered verruga organism, these changes evidently being effected in the bone marrow, as evidenced by the fact that the more abundant the *Bartonella* bodies are the

more abundant are normoblasts, megaloblasts and other abnormal red cells in the peripheral circulation.

8. Neither Carrion's fever nor verruga eruption can be produced in either man or laboratory animals by the injection of blood containing the *Bartonia* bodies alone, but both can be produced in man by injection of the virus from the human eruption, and the benign form can be produced in laboratory animals by such injection, the reason why the acute form has not been similarly produced being that either the animals are far less susceptible to the disease than man or the toxicity of the virus becomes attenuated for them after running its course in man, though experience indicates that it may yet be so produced in monkeys if not in other animals.

9. The pathologic microorganisms transmitted by *Phlebotomus* in all parts of the world so far as known invariably set up an initial fever stage of longer or shorter duration and greater or less intensity, and verruga eruption is in every case preceded by some degree of pyrexia, though sometimes so slight as to be hardly noticeable.

10. The eruption following Carrion's fever as well as the eruption preceded by mild fever or an almost unappreciable degree of fever both show a marked tendency to appear first at the sites of inoculation by the *Phlebotomus* and to become most pronounced at such sites.

11. Cases of eruption following either often if not always confer immunity against both.

12. *Phlebotomus verrucarum* gets its infection certainly from some reservoir, probably one of the native mammals, but whether from the lower mammals or man it is practically certain that the reservoir of infection supplies but one kind of microbe capable of developing in and being transmitted by the carrier.

13. Both are amenable to the same treatment so far as this has been determined for either.

All of the above facts have been verified by the writer's work and experience during his investigation of verruga transmission in the verruga zones and in the laboratory. Severe pyrexia has resulted in a *Cebus capuchinus*

from the bites of the *Phlebotomus*, the rectal temperature passing 43° C. and the red cells showing the *Bartonia* bodies. Miliar eruption succeeded. The *Bartonia* bodies have also been found by the writer in the red cells of dog, rabbit and guinea-pig inoculated with the *Phlebotomus*. Eruption away from site of inoculation has been produced in a hairless dog by hypodermic injection of over 400 *Phlebotomus* in five lots, mashed up in physiological solution. Upon the excision of a large nodule, another has grown in its place. The writer's assistant in the verruga work, Mr. George E. Nicholson, is in the hospital with verruga, the result of 55 bites by *Phlebotomus* September 17 last at Verrugas Canyon, due to inadvertently getting his hands in contact with the net while asleep. His symptoms have been high fever with severe bone pains, and a large number of *Bartonia* bodies in the red cells. Details of the experiments with laboratory animals will shortly be presented, including blood and tissue studies, temperatures and weights, with illustrations.

Almost any one of the above reasons, taken by itself, would seem to indicate conclusively the unity of verruga. If Dr. Strong's thesis can be made to harmonize with all of these facts, then it is possible that he is right, but the indications seem to point strongly the other way. CHARLES H. T. TOWNSEND

VERRUGA LABORATORY,

CHOSICA, PERU,

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SCIENTIFIC BOOKS

Scott's Last Expedition. Vol. I., being the Journals of CAPTAIN R. F. SCOTT, R.N., C.V.O. Vol. II., being the Reports of the Journeys and the Scientific Work undertaken by DR. E. A. WILSON and the surviving members of the Expedition. Arranged by LEONARD HUXLEY, with a preface by SIR CLEMENTS R. MARKHAM, K.C.B., F.R.S. With 18 colored plates, 260 full-page and smaller illustrations. New York. Dodd, Mead and Company, 1913. Large 8vo. 2 vols. xxiv + 443, xiv + 376 pp. 8 maps. \$10.00 net.